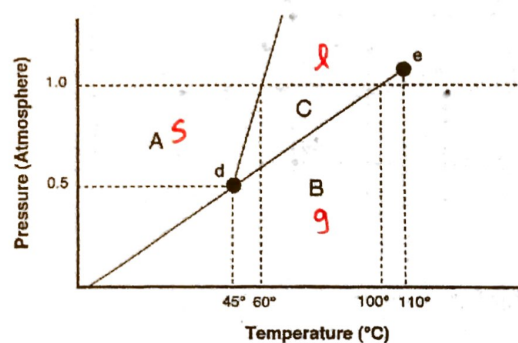


### PHASE DIAGRAMS #3 (Single Component)

#### Part A – Generic Phase Diagram

Answer the questions below in relation to the following generic phase diagram.



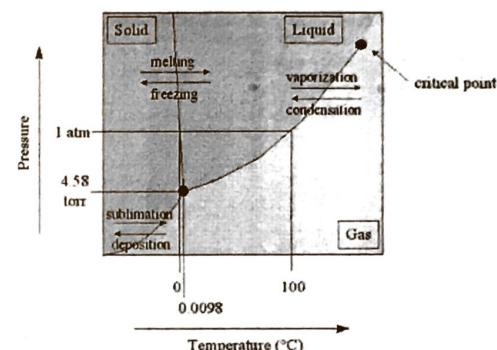
- Which section represents the solid phase? A
- What section represents the liquid phase? C
- What section represents the gas phase? B
- What letter represents the triple point? D
- In your own words, what is the definition of a triple point?  
where all three phases (s, l, g) are at equilibrium
- What is this substance's normal melting point? 60°C @ 1.00 atm
- What is this substance's normal boiling point? 100°C @ 1.00 atm
- Above what temperature is it impossible to liquefy this substance, no matter what the pressure? 110°C
- At what temperature and pressure do all three phases coexist? 45°C @ 0.5 atm
- At a constant temperature, what would you do to cause this substance to change from the liquid phase to the solid phase? @ Constant temp: Increase pressure @ set temp to go from l → s

11. What does sublimation mean?

A substance goes from s → g without ever entering into the liquid state

#### Part B – Phase Diagram for Water

- What is the normal freezing point of water? 0°C @ 1.00 atm
- What is the normal boiling point of water? 100°C @ 1.00 atm
- In Albuquerque, NM, it is approximately 5,500 feet above sea level, which means the normal atmospheric pressure is less than 1 atm. In Albuquerque, will water freeze at a lower temperature or a higher temperature than at 1 atmosphere? Higher than @ 1.00 atm
- If the normal atmospheric pressure is less than 1 atm, will water boil at a higher or lower temperature, than at 1 atmosphere? Lower than @ 1.00 atm



#### Part C – Phase Diagram for Carbon Dioxide

- At 1 atmosphere and room temperature (25°C), would you expect solid carbon dioxide to melt to the liquid phase, or sublime to the gas phase? Sublime
- Some industrial processes require carbon dioxide. The carbon dioxide is stored on-site in large tanks as liquid carbon dioxide. Assuming we lived at sea level (1 atm), how could carbon dioxide be liquefied?

- Temp needs to be > -56.7°C
- Pressure needs to be > 5.1 atm

